Swan Lake Forest Research Reserve

20-year Management Plan:

2005 – 2025

Ontario

Ontario Forest Research Institute

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Swan Lake Forest Research Reserve

20-year Management Plan: 2005 – 2025

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2005

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Cover photos *(clockwise from top right) Harvey Anderson explains a prescribed burning experiment to members of a scientific review team evaluating the Swan Lake Reserve research program. 1986. Aerial view of Swan Lake and surrounding area. 1993. Harvey Anderson and Jim Rice describe a yellow birch patch dynamics study to the Ontario Long-Term Ecological Research (LTER) Program steering committee. 1992. Marvin Chartrand measures tree diameter at breast height. 2005. Don Burton services a weather station established in a permanent sample plot. 1952. Typical stand of tolerant hardwoods*

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EXECUTIVE SUMMARY

Established in 1950 to study the ecology and silviculture of commercially important hardwood species of south-central Ontario, the Swan Lake Forest Research Reserve is operated by the Forest Research and Development Section (FRDS) of the Ontario Ministry of Natural Resources (MNR). The 3480 ha reserve encompasses Great Lakes-St. Lawrence region forest, small headwater lakes, coldwater streams, and a variety of wetlands. Situated in the southwest corner of Algonquin Provincial Park, the reserve is subject to all Park policies and regulations.

The Forest Research and Development Section maintains the Swan Lake Forest Research Reserve to provide a secure, dedicated Great Lakes-St. Lawrence region research forest where this section and its science partners:

(1) carry out long-term research projects on forest ecosystem ecology and silviculture in support of MNR policy and guideline development related to sustainable forest ecosystem management; and

(2) deliver extension activities to communicate and visually demonstrate the methods and results of the research to MNR staff, clients, and partners.

Research at this facility has made major contributions to forest management knowledge. Studies carried out in the reserve have been essential to our understanding of the ecology, silviculture, and management of tolerant hardwoods in central Ontario and the results of this research have been integrated into forest management techniques and policy. As the long-term studies in the reserve continue to produce new information and discoveries, the reserve's value as a scientific and educational resource for the MNR and its clients and partners continues to grow.

Planned activities at the research reserve over the next 20 years include:

- continuing the ongoing studies on silviculture and forest ecosystem ecology, including studies with harvesting treatments;
- initiating new studies to meet emerging science questions in sustainable forest ecosystem management;
- transferring scientific knowledge through tours, workshops, demonstrations, and training exercises; and
- consolidating and maintaining the existing infrastructure (roads, buildings, utilities) in the reserve to support these research and extension activities.

This management plan supersedes the previous planning document for the Swan Lake Forest Research Reserve, the *Forest Research Plan – Swan Lake Forest Research Reserve* (McLean 1983). It:

- documents the objectives and planned research, extension, and infrastructure activities for the Swan Lake Forest Research Reserve for the next 20 years (2005-2025);
- identifies how the objectives and planned activities comply with the Park's management plan and other relevant MNR policies and guidelines; and
- functions as a decision support tool for the MNR Forest Research and Development Section and the Algonquin Park Management Team during all phases (proposal development, review for approval, and implementation) of projects carried out in the Reserve.

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1. INTRODUCTION

The Swan Lake Forest Research Reserve in Algonquin Provincial Park is an Ontario Ministry of Natural Resources (MNR) facility operated by the Forest Research and Development Section (FRDS), which is headquartered at the Ontario Forest Research Institute. All facilities in the research reserve (hereinafter referred to as the Reserve) are the responsibility (e.g., financial, operational) of FRDS unless otherwise specified. All activities in the Reserve are subject to Algonquin Provincial Park (hereinafter referred to as the Park) regulations (as detailed in Section 8) and require approval from the Park Superintendent (as detailed in Section 7). This document details FRDS plans for the Reserve for the next 20 years.

1.1. VALUE OF THE RESERVE

Established in 1950 to study the ecology and silviculture of the commercially important hardwood species of south-central Ontario, the Reserve is a valuable scientific and educational resource. The strengths of the Reserve include:

- forest management practices can be directed to achieve scientific objectives rather than commercial objectives;
- the proximity of harvested forest stands and unmanaged mature and old-growth forest allows for sound experimental designs for assessing the effects of forest management practices;
- the diversity of forest types and conditions that exist within the Reserve allow for a variety of studies on forest ecosystems and silviculture;
- long-term studies are established for which data have been collected 35 years or more and selection harvests have been applied as many as 4 times;
- infrastructure (road network and facilities) is in place to support research and extension activities; and
- the central location makes it easy to get to from a number of population centres.

The Reserve's value to the MNR, to Algonquin Provincial Park, and to the province of Ontario continues to increase with each successive year that ongoing long-term studies are maintained, remeasured, and reported on.

1.2. BENEFITS OF RESEARCH IN THE RESERVE

Research carried out in the Reserve has made major contributions to forest management knowledge, practices, and policies. The studies carried out in the Reserve on yellow birch regeneration, sugar maple recruitment, hardwood tree-quality development, prescribed burning in hardwoods, and tree marking and harvesting prescriptions have been essential to our understanding of the ecology, silviculture, and management of tolerant hardwoods in central Ontario, and the results of this research have been integrated into forest management policy and practice. The hardwood silviculture guides for Algonquin Park (OMNR 1973, OMNR 1983) drew extensively from research carried out in the Reserve, as did the provincial hardwood silviculture guides (Anderson *et al.* 1990, OMNR 1998b) and hardwood tree marking guides (Anderson and Rice 1993, OMNR 2004b). Long-term growth and tree-quality data from silviculture studies carried out in the Reserve have been used extensively in the recent benchmark growth and yield curves project for tolerant hardwoods in Ontario (Penner 2003). As well, data and insights from a forest-lake ecology project being conducted in the Reserve contributed to the latest revision of the provincial *Timber Management Guidelines for the Protection of Fish Habitat* (OMNR *in review*).

More than 160 publications have been produced as a result of research that has occurred in the Reserve. The *Swan Lake Forest Research Reserve Annotated Bibliography 1955-1999* (Cole *et al.* 1999) documents those published before 2000, and more continue to be produced from ongoing studies. As well, innumerable tours, workshops, international meetings, and training exercises have taken place at the Reserve, ensuring that the knowledge gained through this research is extended not just to the science community (academics and students), but also to forest industry staff and government policymakers.

1.3. OBJECTIVES FOR THE RESERVE

The Swan Lake Forest Research Reserve provides a secure, dedicated Great Lakes-St. Lawrence region research forest where FRDS and its science partners:

(1) carry out long-term research projects on forest ecosystem ecology and silviculture in support of MNR policy and guideline development related to sustainable forest ecosystem management; and

(2) deliver extension activities to communicate and visually demonstrate the methods and results of the research to MNR staff, clients, and partners.

Long-term research, in which carefully designed and regularly monitored studies are carried out over years or decades, is an essential component of a comprehensive scientific approach to forest ecosystem management that complements shorter-term research projects and operational trials. Such research is difficult and risky to undertake exclusively on a landbase of commercially managed forests dominated by 5- to 10-year management plans and volatile resource-based markets. In the Swan Lake Forest Research Reserve, where forest management practices are driven by research objectives rather than commercial interests, studies have been running for as long as 35 years. These ongoing long-term studies are producing information that will enhance future provincial policies and lead to superior forest ecosystem management.

The role of science extension (the transfer of results, knowledge, and best practices) to MNR staff, forest industry staff, government policymakers, academics, students, and the general public is an integral part of the research function of the Swan Lake Forest Research Reserve. This is accomplished through activities such as on-site tours, training workshops, and demonstrations of sustainable silviculture and forest management methods. Oral presentations of the results of research evaluating different forest management practices (e.g., single-tree selection harvesting with careful logging compared to no harvesting) are combined with the visually powerful effect of walking through those forest stands from which the measurements were collected. Opportunities to see uncut old-growth hardwood stands and compare them with managed stands that have had up to 4 selection harvests and little or no high-grading are rare. Few locations exist in Canada, let alone Ontario, where this is possible and where the visible results are backed up by carefully measured and analyzed data.

The objectives of the Research Reserve are in harmony with the goals and objectives of Ontario Parks, and Algonquin Park in particular. To maintain this harmony, all activities in the Reserve will be conducted in accordance with Park regulations, and in such a way as to protect Park values and the enjoyment of the Park by other users.

1.4. PURPOSE OF THIS MANAGEMENT PLAN

This management plan supersedes the previous planning document for the Swan Lake Forest Research Reserve, the *Forest Research Plan – Swan Lake Forest Research Reserve* (McLean 1983). It:

- documents the objectives and planned research, extension, and infrastructure activities for the Swan Lake Forest Research Reserve for the next 20 years (2005-2025);
- identifies how the objectives and planned activities comply with the Park's management plan and other relevant MNR policies and guidelines; and
- functions as a decision support tool for the MNR Forest Research and Development Section and the Algonquin Park Management Team during all phases (proposal development, review for approval, and implementation) of projects carried out in the Reserve.

2. SITE DESCRIPTION

The Swan Lake Forest Research Reserve encompasses 3480 ha within Peck Township in the southwest corner of Algonquin Provincial Park (Fig. 1). The Reserve lies on the Algonquin Dome, a regionally prominent feature of Precambrian Canadian Shield bedrock reaching elevations of 587 metres above sea level. This area is characterized by rolling hills and high rocky ridges separated by glacially scoured valleys. Soils are generally coarse and medium textured glacial tills deposited in varying depths as outwash flats, ablation moraines, and drumlinoid deposits. The Algonquin Dome has a relatively cool wet climate due to its elevation relative to the surrounding region. This area is classified as Site Region 5E (Georgian Bay) and Site District 5E-9 (Algonquin Park) (Hills 1959), or Ecosite 5E and Ecodistrict 5E-9 under the proposed provincial ecological land classification scheme (unpublished data on file at the MNR, Peterborough). The Reserve encompasses over a dozen small brook trout and bass lakes, including a "trophy" brook trout lake, and a headwater catchment system.

The Reserve lies within the Algonquin-Pontiac section of the Great Lakes-St. Lawrence forest region (Rowe 1972). Forest cover in the Reserve is dominated (58%) by shade-tolerant hardwood stands (predominantly sugar maple (*Acer saccharum* Marsh.), American beech (*Fagus*

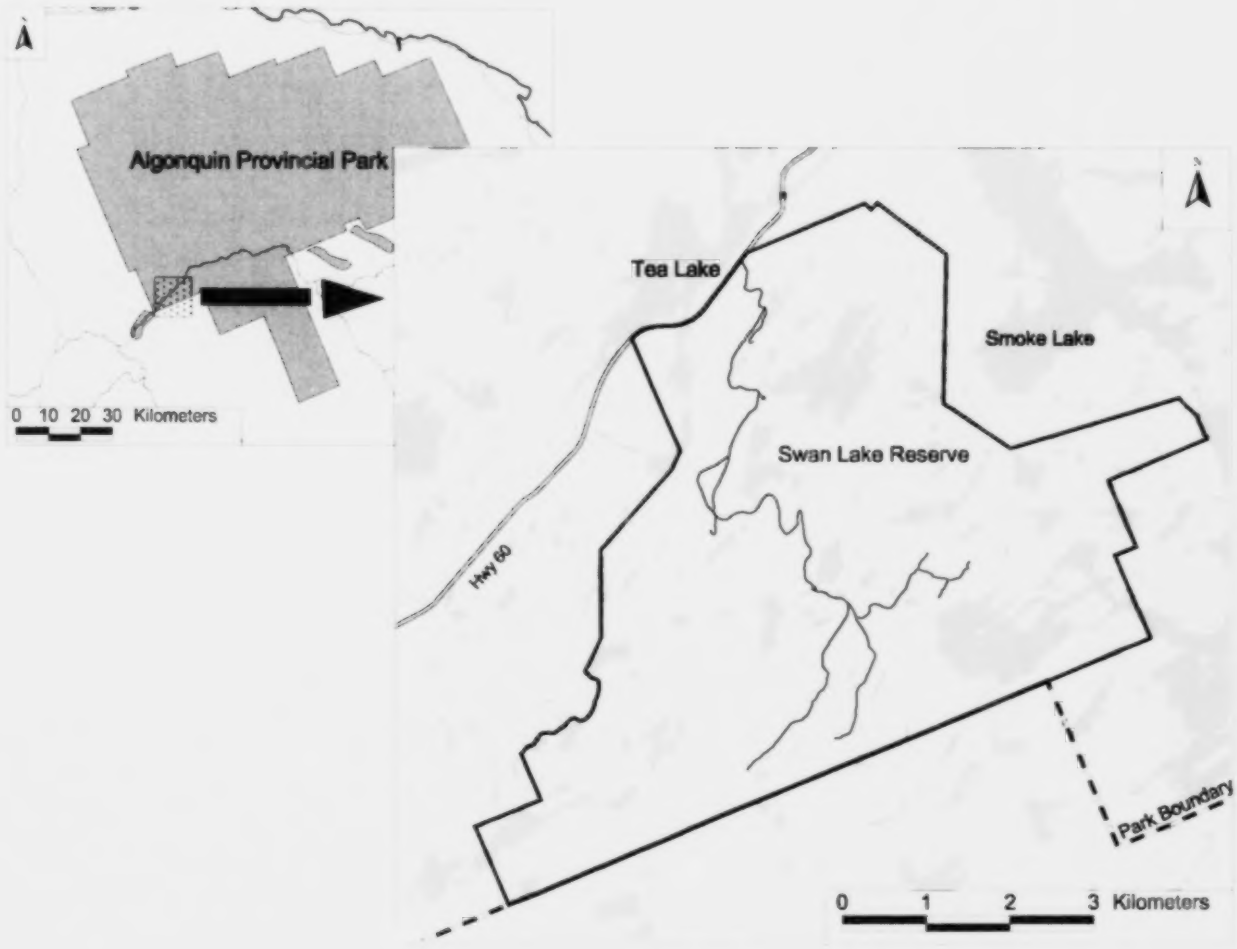
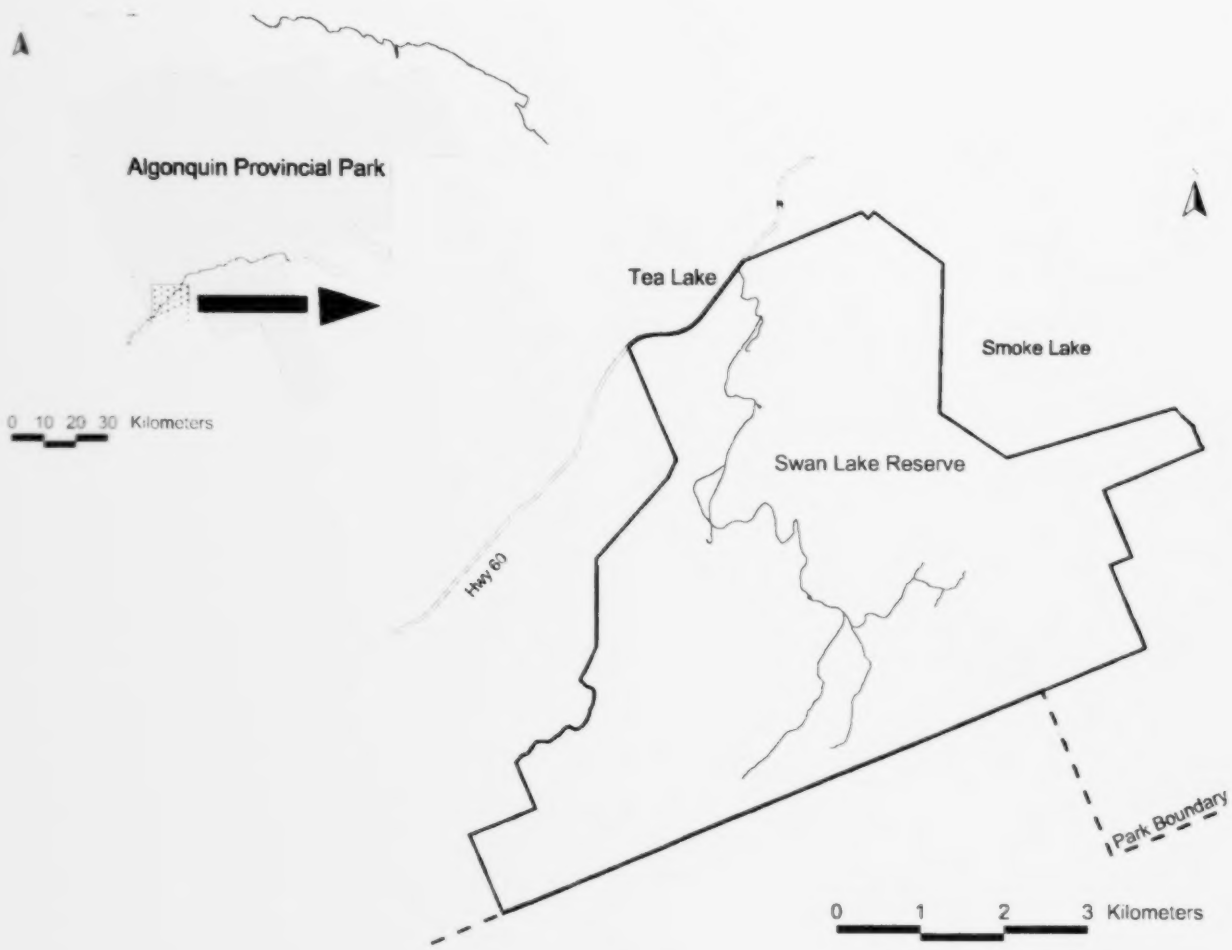


Figure 1. *Location of the Swan Lake Forest Research Reserve in Algonquin Provincial Park.*

grandifolia Ehrh.), and yellow birch (*Betula alleghaniensis* Britt.)). Conifer stands (primarily eastern hemlock (*Tsuga canadensis* (L.) Carrière), eastern white pine (*Pinus strobus* L.), eastern white cedar (*Thuja occidentalis* L.), balsam fir (*Abies balsamea* (L.) Mill.), black spruce (*Picea mariana* (Mill.) BSP), white spruce (*Picea glauca* (Moench) Voss), and red spruce (*Picea rubens* Sarg.)) constitute only a small portion (16%) of the forest in the Reserve, with mixedwood stands making up the balance (26%).

3. HISTORY OF THE RESERVE

The Swan Lake Forest Research Reserve was established in 1950 by the Ontario Department of Lands and Forests (forerunner to MNR) to study the silvical characteristics of the commercially important species of the tolerant hardwood forest in south-central Ontario, especially yellow birch. Yellow birch veneer had been used extensively in the construction of the Mosquito Bomber during World War II. After the war, a regeneration survey of Ontario forests found that yellow birch was not re-establishing after harvest. After surveying much



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Research camp of tents on an island in Swan Lake, 1951

Original cabin near the shore of Swan Lake, 1954

Research camp overlooking Swan Lake, 1997

One of the early cabins, near the shore of Scott Lake, 1997

of the province (from the shores of Lakes Ontario and Erie, east to Kemptville, and north and west to Sault Ste. Marie), the Swan Lake area was chosen as the location for the forest research reserve because it was in the centre of ecological dominance of the sugar maple-yellow birch association in Ontario, was readily accessible, was protected by virtue of being in a provincial park, and included a variety of sites and species mixes typical of the tolerant hardwood forest. The location was particularly appropriate because one of the original objectives of Algonquin Provincial Park was to provide an area for experiments in forestry. Much of the large white pine in the area had been cut in the 1800s, and some of the hardwood stands in and around the Reserve were lightly harvested for high-quality yellow birch in the 1920s and 1930s, but otherwise the forest was relatively undisturbed.

The original area set aside in 1950 was 1133 ha (2800 acres), of which 486 ha (1200 acres) were under a timber licence. Muskoka Wood Products, the company holding the licence, agreed to harvest this area under the direction of science staff, and the first experimental harvest occurred in 1953. The timber licence was transferred from Muskoka Wood Products to Hay and Company, then to Weldwood of Canada. In 1965 the Reserve was withdrawn from the area under licence to Weldwood. At the same time another 2347 ha (5800 acres) of land were added to the research area, expanding the Reserve to its current size. When the Algonquin Forest Authority (AFA) was created in 1974, all timber rights in the Park were assigned to this new crown agency. In 1980, Park and MNR regional staff determined that the Reserve should not be included in the allowable cut calculations of the AFA, resulting in the removal of 3024 ha (7472 acres) of productive forest from the AFA's forest management land base. Since 1980, all research harvesting conducted in the Reserve has been carried out by the AFA under contract to the MNR, with the value of recovered timber applied to harvesting and related on-site silviculture and research costs.

The *Algonquin Provincial Park Master Plan* (OMNR 1974) divided the Park into zones with differing objectives and regulations. This plan had part of the Reserve in the recreation zone and part of it in the recreation/utilization zone. Although the master plan recognized the Reserve and its objectives, as of the early 1980s the boundaries of the Reserve had never been precisely identified. In 1983 the metes and bounds of the Reserve were surveyed and the boundary was officially recognized. At this time the Reserve was also rezoned and added to the Parkway Development Zone to further protect its value as a research forest. In 1992, the boundaries of several nature reserves, including the Minto Lake Hardwoods Nature Reserve (N-22) which borders the west side of the Swan Lake Forest Research Reserve, were modified to be more ecologically based and easily identifiable. However, with this amendment the Nature Reserve impinged on the boundaries of the Research Reserve. Figure 1 is drawn with the boundaries of the Nature Reserve, set in 1992, superseding those of the Research Reserve, set in 1983. However, there has been no official modification of the Research Reserve boundary or area.

In the early 1950s the first research camp consisted of tents on an island in Swan Lake. Supplies were carried in via a walking trail from Highway 60 at the northeast corner of the Reserve. The first experimental harvest, carried out in 1953, required construction of a haul road, which then provided access to the interior of the Reserve. A permanent camp was soon established overlooking Swan Lake. Initially consisting of a single cabin, the facility was gradually expanded and currently consists of 8 buildings and a number of utilities. The access road was extended south in 1957 from the camp to what was then the boundary of the Reserve, and again in 1965 to its current extent.

The initial research in the Reserve concentrated on the physiological and environmental requirements for successful yellow birch establishment and growth (e.g., seed numbers and viability, light, site conditions). Early studies focused on the timing and pattern of harvest, site preparation requirements, and seed-year patterns. This research culminated in the development of prescriptions for maintaining or restoring yellow birch in forest ecosystems.

Although sugar maple is the most common species in the Reserve, in 1950 it was not considered a commercial species due to poor quality and high levels of cull. In 1958 studies were initiated in the Reserve on the factors affecting sugar maple quality development and growth. These studies significantly contributed to the development of regional and provincial tolerant hardwood silvicultural and tree marking guides.

Over the years, a variety of research topics have been studied in the Reserve. In 1960, research on genetics and nutrient cycling in spruce stands began, resulting in the establishment of 5 spruce plantations and numerous natural-stand study plots. The newest field of research in the Reserve, initiated in 1993, is a series of studies on the linkages between forest and lake ecosystems, including riparian zone nutrient and carbon dynamics and the ecological properties of logs found in the shallow near-shore zone of lakes.

4. RESEARCH

The purpose of the Swan Lake Forest Research Reserve is to provide an area in which FRDS conducts research in support of provincial legislation and MNR policy and guideline development related to sustainable forest ecosystem management, and in which forest ecosystem research and extension are the priorities. Research activities in the Reserve must be conducted in such a way as to protect Park values (e.g., plant communities, wildlife, cultural resources), maintain ecological integrity, and protect the enjoyment of the Park by other users. All research studies in the Reserve are subject to approval by the Park Superintendent (see Section 7). The Forest Research and Development Section currently has 12 active research studies in the Reserve (Fig. 2; Table 1). Further details on these (and other) studies are available in the *Ontario Hardwood Silviculture Studies Database: Metadata Report* (Cole et al. 2005).

The total area of forest expected to be harvested from 2005 to 2025 as a result of research activities in the Reserve is approximately 39 ha, with approximately 21 ha harvested for 2 studies in 2005, approximately 18 ha harvested for 3 studies in 2008, and the same 21 ha harvested again in 2017 (Table 2).

New studies may be initiated or current studies may be expanded to new sites within the Reserve to meet emerging science questions. Collaborative studies with Park staff and with other research units operating within the Park are encouraged. Research projects in the Reserve may include limited forest harvesting, but will be designed to respect the Park's native plant and animal species composition and ecological functions. For example, future research in the Reserve will not involve introducing species that are not native to the Park. The initiation of new studies or expansion of current studies is contingent on approval from the Park Superintendent.

In developing new studies, preference will be given to potential sites close to or accessible by existing roads. One site immediately southeast of Mikado Lake has already been identified and informally surveyed as a candidate tolerant hardwood research site (Fig. 2, location "C"). This 50-60 ha area, which is readily accessible using an existing road, is a relatively uniform northwest-facing gentle slope with mature tolerant hardwood forest cover. Should it meet the site requirements and stand structure needs of a future research question, this site would be the first alternative considered. However, ecological and silvicultural considerations will take precedence when deciding on locations for new studies, which may result in requests by FRDS to the Park Superintendent for approval for new access roads or trails.

Research harvesting and experimental forestry activities will comply with provincial harvesting standards (e.g., Crown Forest Sustainability Act, Environmental Assessment Act, *Forest Management Planning Manual* (OMNR 2004a), other relevant MNR implementation manuals) as well as Park regulations and operations policies for forest management, including noise standards designating timing and location of operations, and prescriptions for areas of concern (AOCs) identified in

Alan Gordon transfers cover-type information from aerial photos to a base map of the Reserve, 1952

(left to right) Alan Beckwith, Harvey Anderson, and Mike Lewis measure performance of yellow birch germinants, 1954

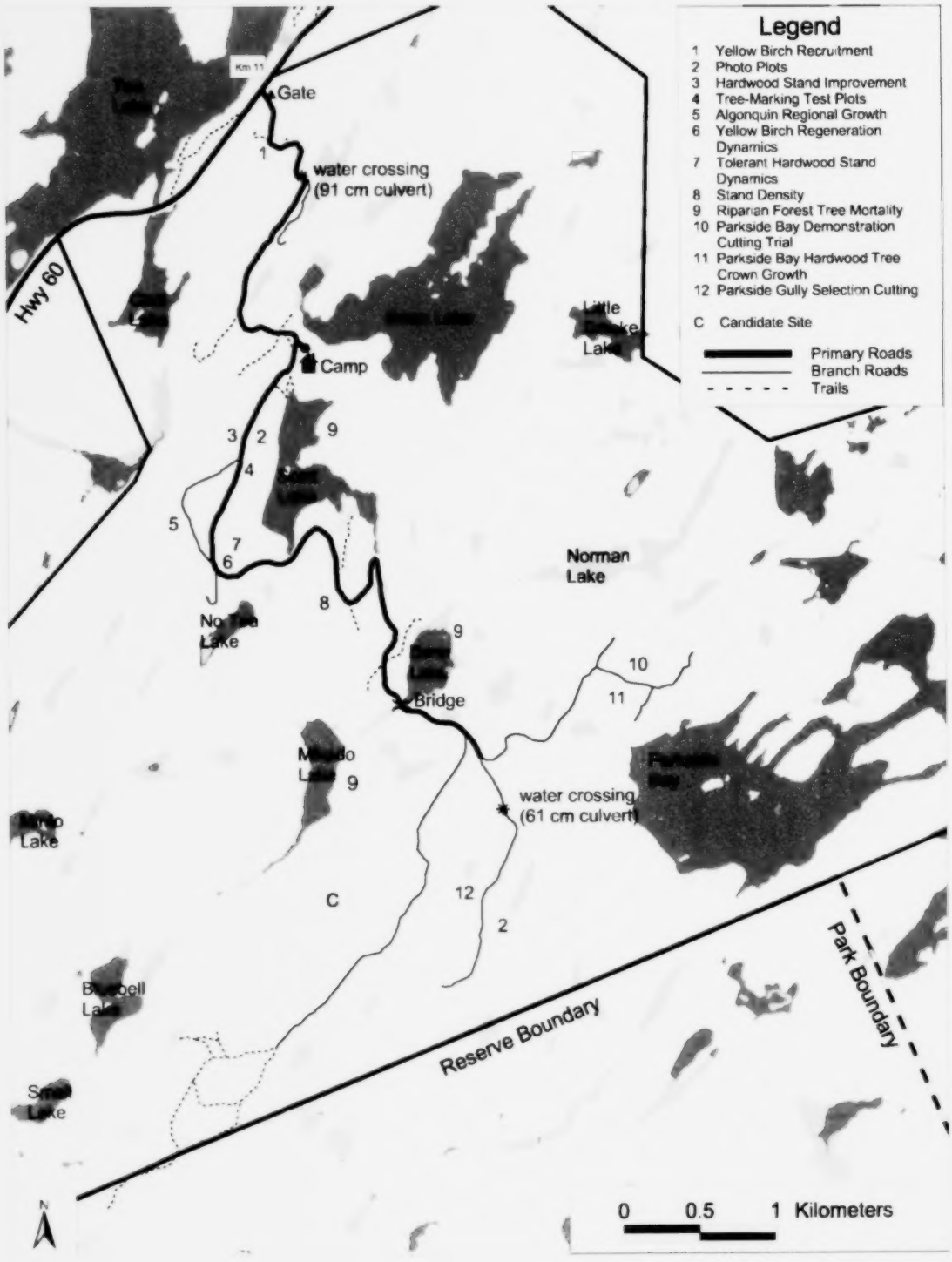


Figure 2. *Road network and location of studies active as of 2005 in the Swan Lake Forest Research Reserve*

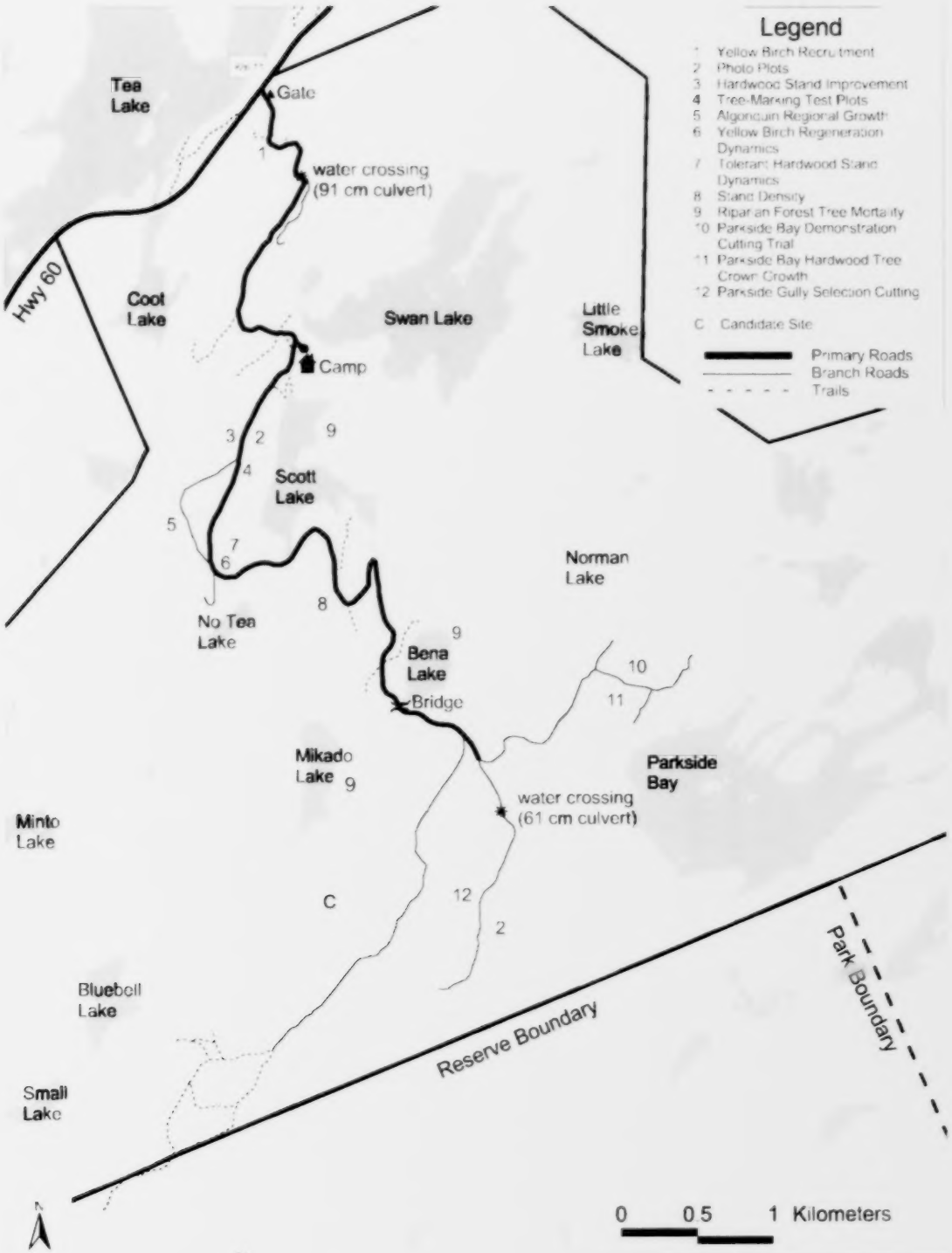


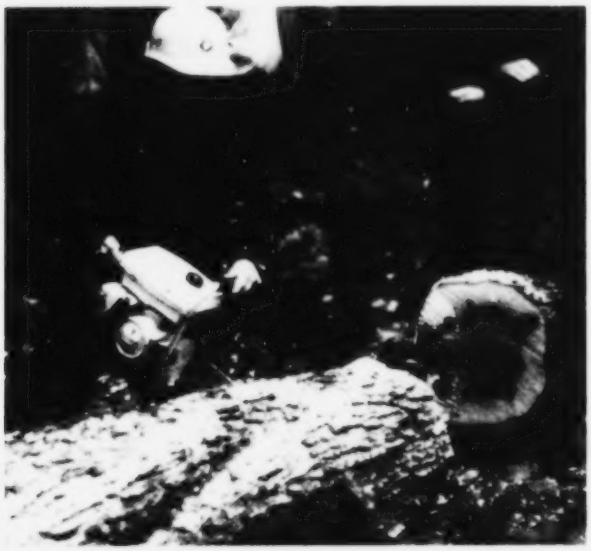
Figure 2. Road network and location of studies active as of 2003 in the Swan Lake Forest Research Reserve

Table 1. *Research studies active as of 2005 in the Swan Lake Forest Research Reserve. Number following study name refers to map location in Figure 2.*

Study and Year Established	Study Design	Objectives	Treatments	Meas. Years	Planned Activities
Yellow Birch Recruitment Study (1) 1989	• 0.64 ha total area • single polar plot	• to study establishment, growth, and recruitment of yellow birch regeneration in a large canopy gap	• site preparation and fencing in 1959 as part of a red pine study (abandoned in 1960) • natural yellow birch regeneration establishment	1989 1990 1991	• no new treatments • remeasure when resources permit • measure ingrowth, tree diameter, crown class, quality class, height, and natural mortality of yellow birch and competitors
Photo Plots (2) 1975	• 5 ha total area • 51 plots ranging from 0.02 to 0.16 ha • 2 sites: Parkside Gully and Scott Lake drumlin • photographs taken from marked locations in pre-defined direction and season	• to illustrate stand dynamics in unmanaged tolerant hardwood stands, as a comparison to managed stands, so that the forest manager may develop a clearer appreciation of the effect their management efforts will have on future development. Slides provide a visual demonstration of stand dynamics while the measurement data provides quantitative support	• none	1975 1976 1983 1990	• re-photograph in 2005, 2015 • measure ingrowth, tree diameter, crown class, quality class, and natural mortality
Hardwood Stand Improvement Study (3) 1966	• 5 ha total area • 8 plots ranging from 0.10 to 0.45 ha	• to rejuvenate an over-mature stand of tolerant hardwoods (sugar maple, yellow birch, and American beech) through a modified selection regime, harvesting the worst trees first on a short cutting cycle • to study the effects of a short stand-entry cycle on tree growth, tree quality improvement, and species diversity on Site Class II	• single-tree selection harvests in 1966, 1973, 1979, 1992-93	1966 1973 1979 1989 1992 1993	• single-tree selection harvests in 2005, 2017 • pre- and post-harvest data collection in 2005/2006, 2017/2018 • measure ingrowth, tree diameter, crown class, crown size, quality class, tree height, logging damage, harvest volumes, and product quality
Tree-Marking Test Plots (4) 1965	• 4 ha total area • 14 plots, each 0.28 ha	• to provide training and testing plots for tree-marking courses in unharvested tolerant hardwoods • to provide a field tour comparison (no treatment) to adjacent Hardwood Stand Improvement Study (study #3)	• none	1966 1974 1976 1980 1983 1989 1995	• remeasure in 2005, 2017 • measure ingrowth, tree diameter, crown class, crown size, quality class, tree height, and natural mortality
Algonquin Regional Growth Study (5) 1977	• 2 ha total area in the Reserve (approximately 20 ha total study area) • 43 plots, each 0.04 ha, in the Reserve (359 plots in ARGS study)	• to determine how site, stocking, structure, and spatial distribution affect tree growth at both the tree and stand level in tolerant hardwood stands	• single-tree selection harvest of some ARGS plots, including 4 of those in Swan Lake Reserve, in 1989-90, due to stagnation of growth	1977 1982 1983 1987 1989 1994 1999	• single-tree selection harvest of previously harvested plots in 2008 • pre- and post-harvest data collection in 2008/2009 • measure ingrowth, tree diameter, crown class, crown size, quality class, tree height, and natural mortality, plus logging damage on harvested plots

Table 1 Cont

Study and Year Established	Study Design	Objectives	Treatments	Meas. Years	Planned Activities
Yellow Birch Regeneration Dynamics Study (6) 1961	• 2 ha total area • 54 regeneration microquadrats, each 1-2 m^2 (est. 1961) • 124 competition plots, each 75 m^2 (est. 1980) • 907 stocking plots, each approximately 11 m^2 (est. 1982)	• to determine the treatments required to regenerate yellow birch, including group selection harvesting, scarification, and prescribed burning to prepare seedbed and control competition from maple and other species • to monitor long-term stand dynamics with no further treatments after regeneration of yellow birch is achieved	• group selection harvesting in 1960 • scarification in 1961 • fencing to control browsing damage • prescribed burning on half of site	1961 1962 1964 1965 1966 1967 1968 1971	• no new treatments • remeasure a subsample of the competition plots when resources permit • measure ingrowth, tree diameter, crown class, quality class, tree height, and natural mortality
Tolerant Hardwood Stand Dynamics Study (7) 1987	• 2 ha total area • single plot (immediately north of Yellow Birch Regeneration Dynamics Study area, study #6)	• to explore the dynamics of a tolerant hardwood stand in the late successional stage using back-projection methods (tree-ring analysis of increment cores for past growth rates and stand reconstruction) • to monitor long-term stand dynamics with no treatments	• none	1988 1989 1990	• remeasure when resources permit • measure ingrowth, tree diameter, crown class, quality class, tree height, and natural mortality
Stand Density Study (8) 1972	• 8 ha total area • 39 plots ranging from 0.10 to 0.20 ha	• to study the effects of variable local site-level stocking resulting from a single stand-level stocking target, on growth and quality development of tolerant hardwoods. Area is generally Site Class II	• single-tree selection harvest in 1972	1972 1973 1978 1984 1991	• single-tree selection harvest in 2008 • pre- and post-harvest data collection in 2008/2009 • measure ingrowth, tree diameter, quality class, tree height, and logging damage
Riparian Forest Tree Mortality Study (9) 1998	• 1 ha total area • 88 square plots, each 0.01 ha, at the forest-lake edge along 3 lake shorelines (Scott, Mikado, and Bena)	• to determine the rates and patterns of tree mortality in lake riparian zones and of aquatic coarse wood input into lake littoral zones • companion to the Turkey Lakes Riparian Tree Mortality Study	• none	1998 2003	• remeasure in 2008, 2018 • measure tree diameter, crown vigour, crown position, tree height, natural mortality, and size and decay class of downed coarse wood
Parkside Bay Demonstration Cutting Trial (10) 1985	• 9 ha total area • 53 square plots, each 0.16 ha	• to demonstrate visually and with growth data the effect of three residual stocking levels on tolerant hardwood forest values. Area is generally Site Class II	• single-tree selection harvest in 1986, with plots assigned to average residual stocking levels of 9.2, 13.8 and 18.4 m^2/ha (40, 60, and 80 ft^2/acre)	1985 1986 1989 1993 1999	• single-tree selection harvest in 2008 to 3 residual basal areas • pre- and post-harvest data collection in 2008/2009 • measure ingrowth, tree diameter, quality class, tree height, logging damage, harvest volumes, and product quality
Parkside Bay Hardwood Tree Crown Growth Study (11) 1993	• 2.5 ha total area • 14 square plots, each 0.16 ha • this study occurs on a subset of Parkside Bay Demonstration Cutting Trial (study #10) plots	• to field test a methodology for measuring hardwood tree crowns • to determine relationships between growth in tree diameter and crown dimensions in hardwood stands	• single-tree selection harvest in 1986, with plots assigned to average residual stocking levels of 9.2, 13.8 and 18.4 m^2/ha (40, 60, and 80 ft^2/acre)	1993 1995 2000	• single-tree selection harvest in 2008 to 3 residual basal areas (applied in study #10) • pre- and post-harvest data collection in 2008/2009 • measure tree crown diameters
Parkside Gully Selection Cutting Study (12) 1967	• 24 ha total area • 44 square plots, each 0.4 ha - 25 treatment (harvest) plots (est. 1967) - 19 control (uncut) plots (est. 1974)	• to study the effects of a short stand-entry cycle on tree growth, tree quality improvement, and species diversity in tolerant hardwood stands on Site Class I	• single-tree selection harvest to a stand residual stocking level of 13.8 m^2/ha (60 ft^2/acre) in 1967, 1980 and 1992 • managed on a short cutting cycle (12-13 years) based on a productive site and high quality trees	1967 1968 1974 1976 1978 1980 1981 1984 1987 1990 1992 1993 1997	• single tree selection harvests in 2005, 2017 • pre- and post-harvest data collection in 2005/2006, 2017/2018 • measure ingrowth, tree diameter, crown class, crown size, quality class, tree height, logging damage, harvest volumes, and product quality



Marvin McLennan bucks a sugar maple tree to examine internal wood quality. 1971

Bill Cole measures tree height using a laser hypsometer. 2001

Table FMP-17 of the *Algonquin Park Forest Management Plan* (AFA and OMNR 2005). Exceptions from the provincial harvesting standards may be requested from the Park Superintendent for harvesting studies that test the effectiveness of those standards. Proposals for such projects would be required to include a monitoring plan and to demonstrate scientific justification for the requested exception. Identification of *new* AOCs within ongoing study areas will be addressed collaboratively by FRDS and Park management, including evaluation of the relative risks to and values of the identified ecological value(s) and the affected research project(s), and may include development of a monitoring plan if modified prescriptions are recommended.

The Reserve is not included in the Algonquin Park forest management plan, and is not part of the available harvest area specified in that plan. Costs for pre- and post-harvest data collection, tree marking, highly controlled tree harvesting, log quality and yield analysis, slash and site management, and road maintenance and repair are expected to significantly exceed revenue from the harvested wood fibre from the relatively small research areas in the Reserve. As in the past, all revenue generated from timber harvested in the Reserve for research purposes will be directly applied to these research-related costs.

Other (non-FRDS) research projects (e.g., studies initiated by Wildlife Research and Development Section, Aquatic Research and Development Section, other agencies, and universities) may be permitted within the Reserve if approved by the Park Superintendent and FRDS management. Proposals for non-FRDS research are to be submitted to the Park Superintendent and the FRDS Hardwood Ecosystem Research Scientist, FRDS Science Management Coordinator, and FRDS Manager with sufficient time allowed for review before the intended start date, generally 3 to 6 months prior to proposed study initiation. FRDS is to be included in this process to ensure that any new studies will not interfere with current or other proposed studies within the Reserve. Once a proposed study is approved, annual work plans are to be submitted to the Park Superintendent and FRDS management for approval using the same time frames recommended for FRDS research projects (see Section 7 for details).

Table 2. *Area (in hectares) of forest expected to be harvested for research purposes in the Swan Lake Forest Research Reserve between 2005 and 2025*

Study number	Year		
	2005	2008	2017
3	5	0	5
5	0	1	0
8	0	8	0
10	0	9	0
12	16	0	16
Total	21	18	21

5. EXTENSION

The Reserve is maintained as a place not only to conduct research, but also to share the knowledge gained from this research through tours, workshops, demonstrations, and training exercises. Although there is no regular schedule for these activities, on average 5 to 10 groups visit the Reserve each year. The Reserve has an international reputation, with forestry professionals visiting Ontario often asking to see the site. As well, forest-related conferences in southern or central Ontario will often include a field tour of the Reserve.

Groups may be as small as a few visiting scientists, or as large as 50 forestry professionals, academics, and university students attending a conference. The mode of transportation for groups visiting the Reserve ranges from pickup trucks and vans to small buses. Extension activities, although less formalized than the research activities in the Reserve, are an integral component of the research function of the Reserve. These opportunities for knowledge transfer are expected to continue at approximately the same frequency during the timeframe of this management plan.

(right to left) Mac McLean and Harvey Anderson discuss site classification methods with visitors from the University of Guelph, Keith Jones and Ted Taylor, 1986

Andy Gordon describes the Swan Lake Forest Research Reserve to researchers involved in the Ontario Long-Term Ecological Research (LTER) Program, 1993

Bill Cole discusses a shoreline coarse wood study with participants in the Ecological Sustainability Leadership training for senior MNR managers, 1995

Harvey Anderson explains gap-phase replacement on a field tour from Westwind Conference Number 9 Natural Disturbance Patterns and Processes in the Great Lakes – St Lawrence Forest, 2002

6. INFRASTRUCTURE

The purpose of the infrastructure in the Reserve (access roads, buildings, and utilities) is to efficiently and effectively support research and extension activities.

6.1. ROADS

A network of approximately 16 km of gravel roads provides access to the Reserve from Highway 60 (Fig. 2). The main road runs from Highway 60, past the camp, terminating at the southern end of the Reserve. Roads are a single lane on a gravel and compacted soil base, with ditches and culverts where needed for drainage. Three permanent water crossings occur on the road network: a bridge at the south end of Bena Lake, one 91 cm (36 in) culvert approximately 0.75 km southeast of the Highway 60 intersection, and one 61 cm (24 in) culvert approximately 1.0 km southeast of the Bena Lake bridge on the hill approach to the Parkside Gully research site. A locked gate at the highway controls access to the road network. Vehicle access is limited to Park staff, FRDS staff and project partners, MNR Aquatic Research and Development Section staff from the Harkness Laboratory of Fisheries Research, staff from the Wildlife Research Station, and service vehicles under FRDS direction. Pedestrian access is allowed and has historically been primarily trout anglers accessing Scott Lake. Vehicle access to the road network will continue to be controlled to support FRDS objectives (e.g., site and research plot security) and Park objectives (e.g., limited vehicle access to Park interior and pedestrian-only access to Scott Lake).

FRDS is operationally, financially, and legally responsible for the Reserve road network, including annual monitoring, maintenance, and repairs of all Reserve roads. However, anyone using the road network can expect to encounter occasional treefalls, and is expected to clear them as needed. All maintenance and repairs (e.g., brushing, adding gravel, grading, replacing culverts) will be conducted in such a way as to protect Park values. For instance, protocols to protect fish habitat will be followed during culvert replacement.

Although the Reserve is not part of an active forest management plan, FRDS will work cooperatively with Park staff to comply with the road reporting guidelines set out in the *Forest Management Planning Manual* (OMNR 2004a), *Forest Information Manual* (OMNR 2001), and directives that may result from the *Forest Roads and Water Crossings Initiative* (e.g., McColm 2003). Road classes have been assigned to all roads in the Reserve, based on definitions in the *Forest Management Planning Manual* (OMNR 2004a). There is one primary road, 7.4 km long. It is a permanent road that provides principal access for the Reserve, and is regularly monitored and maintained to allow motorized vehicle access. Branch roads make up 8.5 km of the Reserve road network. These branches off the primary road provide access to study sites and are regularly monitored for environmental and safety concerns. Trails in the Reserve are either maintained only as walking trails or not maintained at all. Trails close to the Reserve and Park boundary at the southern end of the Reserve (Fig. 2) are retired roads (overgrown and no longer accessible to vehicle traffic) and are not maintained.

In order to support the planned research and extension activities in the Reserve, the road network must provide access to active research sites for field crews, research harvesting operations, tours, and training exercises. Roads will be maintained to allow passage of 4-wheel drive trucks, vans, school buses, harvesting equipment, logging trucks, and service vehicles. However, to minimize the impacts of the road network on Park values, the road-bed crowns and rights-of-way will be maintained at their current widths. When harvesting is planned, roads may need to be repaired to allow safe passage of harvesting equipment and logging trucks, but road width will not be increased. Harvesting operations must be planned accordingly and may need to be modified from current standard regional practices to use smaller logging trucks and shorter log lengths (i.e., no tree-length logs hauled off site; trees skidded to landings and bucked to log lengths capable of being transported off site using existing road bed and right-of-way; tandem trucks used for hauling). Proposals submitted to the Park Superintendent for approval for research harvesting will include details (e.g., who, when, where, how) on log skidding, bucking, and hauling, as well as road maintenance and repair requirements.

If new research is initiated in an area not currently accessible by road, a new road may be proposed. New roads will be designed to minimize impacts on Park values. All details related to the construction of the proposed road must be provided in the proposal for new research. Road construction projects will comply with all legislation, policies, procedures, bulletins, manual, standards, and guidelines for new roads and development projects (for details see Section 8). Construction of any new road in the Reserve is contingent on approval from the Park Superintendent.

Two Park canoe routes occur within the Reserve. One between the Oxtongue River and Smoke Lake enters the Reserve at Hilly Lake and runs through Small, Bluebell,

Mikado, Bena, and Norman Lakes to Smoke Lake. The portage between Mikado and Bena Lakes includes approximately 150 m of the primary road near the Bena Lake bridge. Another canoe route runs from Smoke Lake to Ragged Lake/Parkside Bay, and includes approximately 17 campsites located on Parkside Bay within the Reserve. The Park has exclusive responsibility for (including inspection, maintenance, and use of) the canoe routes, portage trails, and campsites within the Reserve.

Planned Activities:

- Work with Park and/or AFA staff to comply with the road reporting requirements set out in the *Forest Management Planning Manual* (OMNR 2004a) and the *Forest Information Manual* (OMNR 2001) (i.e., develop a use management strategy for the Reserve road network, determine appropriate road ID labels, calculate segment lengths, complete an existing roads table) and ensure that the information is entered into appropriate road or forest management databases (2005).
- Update the road theme in the Swan Lake GIS (Cole *et al.* 1998) and provide relevant road data layers to Park staff (2005).
- Monitor road network (annual inspections) to ensure human and environmental safety, with maintenance as needed. Maintenance may include:
  - bucking and possibly removing fallen trees
  - brushing within road rights-of-way
  - clearing ditches
  - repairing and/or replacing culverts
  - roadbed grading and crown repair
  - adding aggregate as needed from authorized aggregate sources
  - repairing access gate at Highway 60
  - repairing Bena Lake bridge and approaches
- Evaluate trails (retired roads) at the southern border of the Reserve (which is also the Park boundary) to determine whether they are being used to gain unauthorized access to the Park and the Reserve. If trespass problems are detected, modifications will be made to the trails to control and prevent vehicular access (e.g., berms, ditches, blockades, reforestation) (2005, and periodically thereafter).
- There are no plans to remove or decommission any existing roads, or to develop any new roads, during the timeframe of this management plan.

Summary of planned road activities by relevant guideline:

- *Forest Management Planning Manual* (FMPM) (OMNR 2004a):
  - Road classes for Reserve roads are based on definitions of primary and branch roads in the FMPM.
  - Develop a use management strategy for the Reserve road network, including maintenance provisions, monitoring provisions, and public and commercial access provisions and restrictions, with rational for the restrictions.
  - Complete an existing roads table.
  - Submit use management strategy, existing roads table, and digital map of road network to the Park Superintendent.
  - Report any changes to road network or use management strategy to the Park Superintendent in a timely fashion.
- *Forest Information Manual* (FIM) (OMNR 2001):
  - Attributes required for annual road construction/use (Section 3.2.1.3) in the FIM are addressed in this management plan (access type = class, custodian = FRDS, total length of primary and branch roads reported).
  - Determine appropriate road ID labels and individual segment lengths.
  - Include a summary of maintenance activities for the road network in the annual reports submitted to the Park Superintendent.
- *Forest Roads and Water Crossings Initiative Task Team Report* (FRWCI) (McColm 2003):
  - FRDS is responsible for the Reserve road network except for canoe routes and portage trails, which are the responsibility of the Park.
  - FRDS maintains the Reserve road inventory in a GIS database (ArcView 3.x) that includes road classes, water crossings, drainage culverts, and segment lengths (Cole *et al.* 1998).
  - A road network use management strategy for the Reserve road network will be developed based on requirements set out in the FMPM.
  - FRDS will monitor and maintain the road network with special attention to water crossings.
  - Ongoing monitoring, maintenance and emergency repair work will be prioritized to meet: (1) safety needs, (2) environmental needs, (3) MNR program priorities, and (4) the general needs of all users according to the use management strategy for the road network.

- The entire Reserve road network is *retained* (road in proper condition and monitored/ maintained) and *controlled* (road in proper condition but access is restricted).
- This 20-year planning period includes post-forest operations (research and extension access) and periodic active forest operations (research harvesting – see Section 4).

6.2. BUILDINGS AND UTILITIES

FRDS is operationally and financially responsible for research facilities in the Reserve, including all buildings and utilities.

Buildings and utilities in the Reserve are concentrated in a camp overlooking Swan Lake (Fig. 3). The buildings consist of a kitchen, lab, bunkhouse, washrooms, small sleeping cabin (Mac's Cabin), and garage. A diesel generator housed in a shed north of the garage provides electrical service to these 6 buildings via buried cables. Most of the buildings have propane lights, and several have additional propane appliances (refrigerators, large cook stove, water heaters), serviced by buried gas lines from a main tank east of the kitchen. An additional cabin with a kitchen is located on the northwest shore of Scott Lake. The kitchen, bunkhouse and Scott Lake cabin are equipped with wood-burning stoves. A water well with a submersible pump and concrete cistern located just north of the garage can provide potable water for the main camp. A siphon/gravity feed water line from Scott Lake to the camp is also available to provide non-potable water for toilets and cleaning. The main camp has a septic system with a weeping bed located between the kitchen and the lab. As well, four outhouses, one with a composting toilet, are located near the buildings. One building, the original 1953 residence on the south shore of Swan Lake, was destroyed in a fire in April 1998.

Unfortunately, the camp does not meet current provincial health and safety standards. Due to the number of facilities and their age, the cost of bringing all existing buildings and utilities up to current standards is prohibitive. Therefore, FRDS will remove a significant number of buildings and associated utilities from the Reserve as soon as possible. After facilities have been removed or demolished, sites will be rehabilitated to as close to their original condition as possible. Remaining buildings will be modified to bring them up to current provincial health and safety standards (e.g., Ontario Building Code) and to minimize future maintenance costs. Proposals for specific infrastructure removal and renovation will be prepared by FRDS and submitted to the Park Superintendent for approval. These development projects (decommissioning and renovation) will be subject to the provisions of the *Class Environmental Assessment for Provincial Parks and Conservation Reserves* (OMNR 2005) to determine the level of public review and evaluation required prior to project implementation.

During the decision-making process on which buildings and utilities to retain, the following needs were identified in order for on-site facilities to support the planned

Research camp overlooking Swan Lake, 1995

Garage, 1997

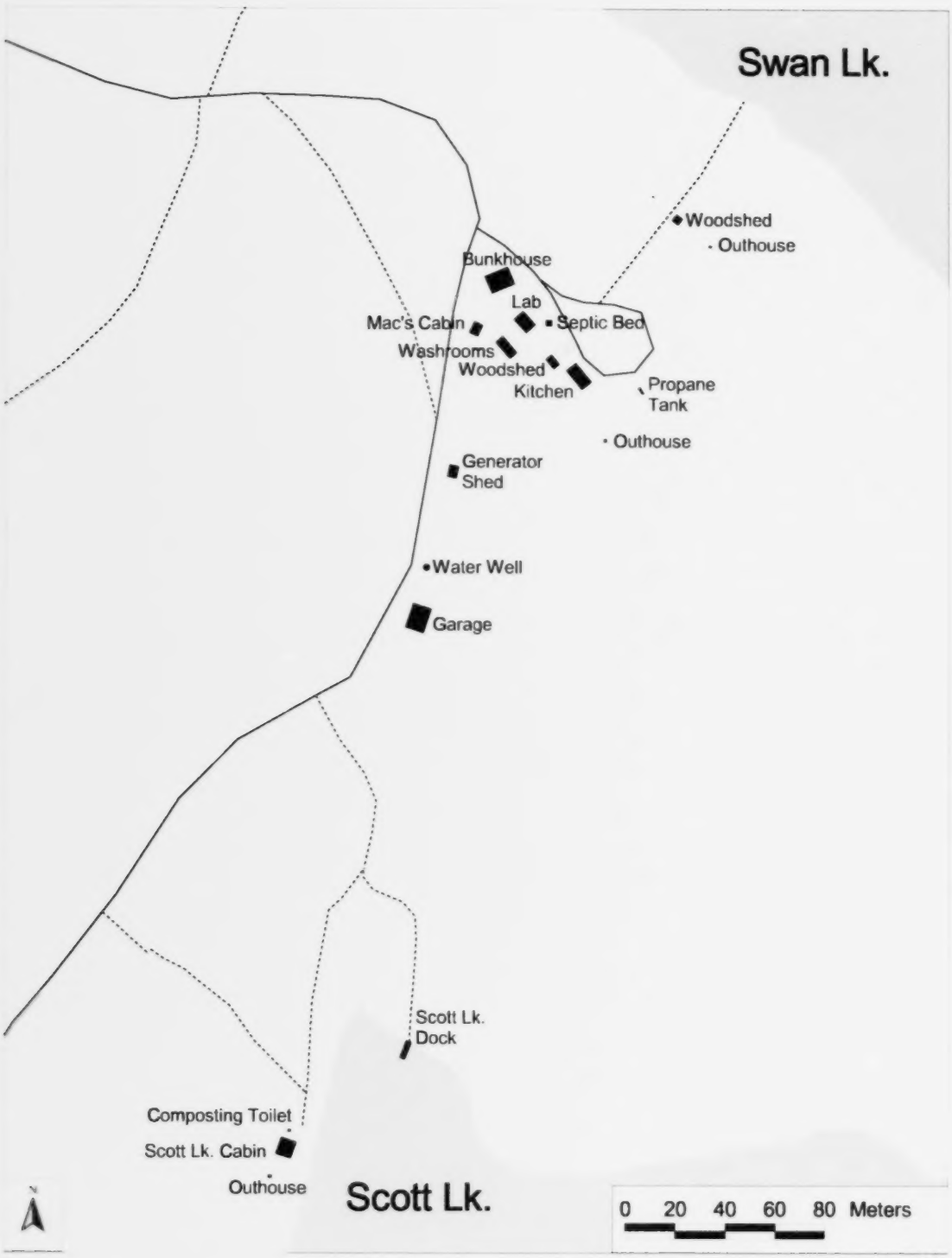


Figure 3 *Location of buildings and utilities in the Swan Lake Forest Research Reserve as of 2005*

research and extension activities in the Reserve:

- Efficient short- and long-term equipment and material storage:
  - easy to open and close for periodic use
  - secure, with locks and shutters or security bars on windows
  - dry and clean, with adequate storage space for field equipment and small vehicles (e.g., ATVs, canoes)
- Versatile day-use shelter for tour groups (up to 50 people)
  - easy to open and close for periodic use
  - working day-use space for meetings, presentations, and temporary shelter from weather
  - power for lights and A/V equipment supplied by portable generator as needed
- Versatile day-use workspace for field crews
  - easy to open and close for periodic use
  - working day-use space for field-related work (e.g., sample preparation and/or identification, data transcription) and temporary shelter from weather
  - power for lights and research equipment supplied by portable generator as needed
- Accommodation for field crews
  - either in permanent buildings (if health and safety standards are met) or in temporary self-contained accommodation (tents or trailers) brought on site for short-term use as needed
  - off-site facilities (e.g., Harkness Lab, commercial lodging) could also be used
- Environmentally compliant toilet facilities
  - outhouses and/or composting toilets for field crews and small tour groups
  - extra portable toilet facilities temporarily supplied as needed for larger tour groups

It was determined that the garage, if modified, would be sufficient to meet these needs.

Planned Activities:

- Consolidate buildings and utilities to effectively support research and extension objectives while minimizing long-term maintenance requirements (2005-2008):
  - remove or demolish all buildings except garage and generator shed, i.e.:
    - bunkhouse
    - lab
    - Mac's cabin
    - washrooms
    - kitchen
    - Scott Lake cabin
  - modify garage to:
    - ensure acceptable health and safety standards for planned use (e.g., add roof and eave ventilation, pour cement floor)
    - increase efficiency of opening and closing for periodic use (e.g., add hinged window shutters)
    - increase security (e.g., add locks to doors and window shutters as needed)
    - decrease maintenance needs
  - move composting toilet and outhouses to garage area
  - decommission individual utilities, i.e.:
    - propane tanks and buried gas lines
    - diesel generator and buried power cables
    - water well, pump, and buried water lines
    - septic system
    - outhouses
- Modify Swan Lake GIS to reflect major changes to infrastructure after work is completed (2008-09)
- Inspect buildings annually and carry out repairs and maintenance as needed

There are no plans to construct any new buildings or to expand the research facilities in the Reserve. However, if one or more new buildings were deemed necessary to support research and extension activities in the Reserve, a detailed proposal for such development would be submitted to the Park Superintendent for approval well in advance of the expected initiation date. Such development projects would comply with all appropriate legislation, policies, procedures, bulletins, manual, standards, and guidelines for new development (see Section 8 for details).

7. COMMUNICATION AND ADMINISTRATION

To facilitate ongoing proactive communication between FRDS and Park management, the following guidelines have been agreed upon:

- FRDS will submit research and infrastructure project proposals and annual plans for the Reserve to the Park Superintendent in time for approval before the work begins. Submissions will be made to the Park Superintendent, who will refer them to the appropriate Park staff member(s). The recommended timeframe for submission is as follows:
  - Annual work plans for ongoing (previously approved) science projects with research activities that are not expected to have an impact on Park values (e.g., plot measurements, photographs, non-destructive tree sampling, minor soil or vegetation sampling, water sampling):
    - submitted during the fourth quarter of the fiscal year preceding the work
  - Annual work plans for ongoing science projects with research activities that may have an impact on Park values (e.g., silvicultural treatments that include tree cutting, herbicide application (when no alternative is available), prescribed fire):
    - submitted 3-6 months before project activities scheduled to begin
  - New science projects that propose research activities that are not expected to have an impact on Park values:
    - submitted 3-6 months before project scheduled to begin
  - New science projects that propose research activities that may have an impact on Park values:
    - submitted 6-12 months before project scheduled to begin (should be submitted prior to securing funding)
  - Minor infrastructure maintenance and repairs:
    - submitted 6 months before project scheduled to begin. However, FRDS may request special expedited review and approval of relevant workplans and permits in the event of essential emergency repairs (e.g., roof damage, culvert wash-out).
  - Major infrastructure repairs or capital development (e.g., bridge repairs, building upgrades, new roads, new buildings):
    - submitted minimum 12 months before project scheduled to begin (should be submitted prior to securing funding)
- FRDS will inform the Park Superintendent of extension activities (e.g., tours, workshops) and provide on-site contact information (e.g., radio, cell phone, voice mail):
  - in the annual plan for any known activities scheduled for the year
  - by e-mail or telephone contact as far in advance as possible for activities scheduled after submission of the annual plan
  - upon arrival (at East or West Gate) for informal tours or research staff visits to site
- A written summary of the previous year's research, extension, and infrastructure activities will be included in the annual plan submission
- The Park Superintendent will notify FRDS in a timely fashion of new regulations or policy changes that may apply to research, extension, or related infrastructure activities in the Reserve
- FRDS will participate in Park and regional science forums and will provide tours and other site-related support to Park staff as requested
- FRDS and Park management will jointly review this management plan every five years to ensure the plan is effective as a decision support tool for activities in the Reserve. Revisions or amendments to this plan, due to changes in FRDS strategic objectives for the Reserve or changes in Park policies and regulations, may be made as necessary. FRDS and Park management will revise and renew this plan in 20 years. Scheduled reviews are as follows:
  - 5-year reviews (2010, 2015, 2020)
  - 20-year revision and renewal (2025)

8. WORKING IN A PROVINCIAL PARK

The Swan Lake Forest Research Reserve lies within the boundaries of Algonquin Provincial Park, hence activities in the Reserve must be compatible with Park objectives (i.e., protection, recreation, heritage appreciation, tourism, resource management) and must be conducted in such a way as to protect Park values (e.g., plant communities, wildlife, cultural resources) and enjoyment of the Park by other users. As a component of the Park, the Reserve is subject to all legislation, regulations, policies, procedures, bulletins, manuals, guidelines, and standards that apply to the Park. Two particularly important documents regulating activities in the Park are described below.

8.1. ALGONQUIN PROVINCIAL PARK MANAGEMENT PLAN

Activities in the Park are guided by the *Algonquin Provincial Park Management Plan* (OMNR 1998a). Sections of the Park management plan that are of particular relevance to the use of the Reserve for the activities detailed in this plan are explained below. However all Park policies, whether or not explicitly mentioned here, apply to the Reserve.

Recognition of the Reserve is provided by the following sections:

8.0 Stewardship Policies
- 8.3 Vegetation
  - 8.3.6 Forest Research
    - *"The goal of the Ontario Long-Term Ecological Research (LTER) Program is to conduct long-term ecological research that is necessary for sustainable ecosystem management and to apply this information to MNR policy development*
      The existing forest research area at Swan Lake, and other areas in the Park, will continue to be set aside for research purposes to support this goal."
      Note: The Ontario LTER Program formed the core of the Swan Lake Reserve research focus in the mid 1990s when this Park management plan was written.

9.0 Operations Policies
- 9.6 Research
  - *"The Forest Research Station at Swan Lake conducts long-term ecological research that is essential for sustainable ecosystem management."*

While these sections of the Park management plan recognize the general role of the Reserve for forest research, the specific objectives of the Reserve stated in this document clarify its intended uses.

Zoning of the Reserve is reflected in the following sections:

6.0 Zoning
- Figure 3 – Zoning Summary
  - Map shows that a Development Zone encompasses the area of the Reserve.
- 6.5 Development Zones
  - *"There are five Development Zones in the Park, totalling approximately 22,545 hectares, which contain operational, research, recreational, and/or interpretive facilities."*

10.0 Development Policies
- Figure 4 – Development
  - Map shows the Reserve as a research area within the Parkway (Highway 60) Corridor Development Zone.
    Note: This map does not show the exact boundaries of the Reserve. Figure 1 in this document depicts the accepted boundaries of the Reserve.

12.0 Public Consultation
- 12.4 Pre-1989 Review Amendments
  - *"In 1983 the Master Plan was first amended to more adequately protect the Swan Lake Forest Research Area by including it within the Parkway Development Zone rather than the Recreation/ Utilization Zone."*

The Reserve is in the Parkway Corridor Development Zone and thus is regulated by Algonquin Park planning and management policies for this zone and Ontario Parks policies for development zones.

Policies on research programs and related activities in the Reserve are addressed in the following section:

9.0 Operations Policies
- 9.6 Research
  - *"All **research programs** require the approval of the Park Superintendent and must meet all the requirements under applicable provincial and federal legislation."*
  - *"Research activities and facilities must be compatible with protection objectives and recreational uses in the Park."*
  - *Research activities are subject to development and management policies for Natural Environment Parks unless otherwise permitted.*
  - *Removal of natural materials or artifacts is strictly prohibited unless authorized by the Park Superintendent, and any materials removed remain the property of the Ministry.*
  - *Sites altered by research activities will be rehabilitated to as close to their original condition as possible."*

- *Research activities will be consistent with the Ontario Parks Research and Information Strategy ([Davidson] 1997) and Park Management Policy PM 2.45 [OMNR 1994]*
- *Research proposals are evaluated by the Park Research Committee (and outside authorities as required) based on the principle that the potential benefits of the research must outweigh the impact of the research on Park users and resources. Only if the positive benefits of the research outweigh any negative impacts is permission granted. Otherwise, modifications may be required or the project proposal is denied. This ensures that there will be no unacceptable impact on either the environment or the use of the area, and that the collection or destruction of any materials will be strictly controlled."*

All research within the Reserve will conform to these policies. For instance, research activities will comply with all applicable federal and provincial laws and regulations. All proposals for new research programs will be submitted to the Park Superintendent for approval.

Non-commercial vegetation management in the Reserve is permitted under the following section:

8.0 Stewardship Policies

8.3 Vegetation

8.3.1 Non-commercial Vegetation Management

- *"The **cutting** of vegetation for general maintenance or safety reasons is permitted in all zones.*
- *Vegetation may be cut for the development or maintenance of portages, trails and campsites in Development, Wilderness, Nature Reserve, Historical, Natural Environment and Recreation/ Utilization Zones.*
- *Any other cutting of vegetation in a Development Zone must be carried out according to an approved plan."*
- *"Chainsaws are prohibited in the Park, except for maintenance and management purposes by leaseholders, contractors, the AFA, the MNR researchers, Ontario Hydro [now Hydro One], and the Ministry of Transportation as authorized by the Park Superintendent."*

Research harvesting is non-commercial vegetation management and thus is permitted within a Development Zone, provided it is carried out according to an approved plan. Plans for research harvesting will be included in proposals for new research as well as in annual work plans submitted to the Park Superintendent for approval. Trees in the Reserve may also be cut for safety reasons or for trail maintenance or development.

Although the Reserve is located within a Development Zone, rather than the Recreation/ Utilization Zone, all non-commercial management of vegetation in the Reserve for research purposes will conform to the operations policies for forest management in the Park, as described in the following sections:

9.0 Operations Policies

9.2 Forest Management

- *"All operations must conform to the* Environmental Assessment Act *and be carried out in accordance with Ministry implementation manuals. They must also subscribe to specific restrictions that protect Park values."*

9.2.1 Areas of Concern

- *"The **area of concern** process within the Park Forest Management Plan is used to modify forest management operations and to protect Park values. This process of identifying natural, cultural or recreational values for protection results in the establishment of no-cut reserves and modified cutting areas. The width of the area of concern and the no-cut or modified cut areas varies depending on the particular value (e.g., water-body, wildlife) and characteristics of the land base."*
- *"In no-cut reserves, no marking or cutting is done within a minimum (slope dependent) of 30 metres of any body of water, 30 metres of a public road and railway rights-of-way, 60 metres of portages, winter portages, and ski trails, or 15 metres of the Algonquin Park boundary, except for recreation or aesthetic purposes.*
- *Modified cutting areas, which occur beyond the no-cut reservations, specify the type of silvicultural system used and the degree of cutting.*
- *All slash within 120 metres of publicly used waters, public roads, railway rights-of-way, portages and trails must have tops removed from the reserve or lopped to within 1 metre of the ground where safety permits."*

9.2.3 Noise Standards

- *"Forest management operations (including road construction) carried out between the last Saturday in June and Labour Day (both dates inclusive) are prohibited within 1.6 kilometres of canoe routes and recreational trails.*
- *During this same period, the movement of hauling trucks and other heavy equipment to, from, and through these areas is restricted to between 7:30 a.m. and 6:30 p.m. daylight saving time (Monday to Friday inclusive, statutory holidays exclusive) with the exception of the Achray/Lake Travers Road and all roads north of the Petawawa River (see Appendix F).*
- *In harvest areas adjacent to high off-season recreational use areas or where the topography permits sound travel, noise restrictions may be adjusted in both the timing and distance of operations as determined at the Forest Management Planning Stage."*

9.2.5 Roads and Landings

- *"All landings will be restricted in size to a maximum of 0.2 hectares."*

Note: Policies relevant to the Reserve on planning and construction of new roads are discussed separately, in a section that follows.

9.2.8 Transportation of Timber and Other Activities

- *"The rafting of logs across lakes and the driving of rivers is prohibited in the Park, and Park waters may not be used as log storage areas."*
- *"The **salvage** of old logs from Algonquin Park waters is not permitted."*
- ***Herbicides** may be used in commercial vegetation control in the Recreation/Utilization zones, however, the AFA will look at viable alternatives to the use of herbicides for silvicultural purposes. Herbicides will only be used as a last resort."*

Note: FRDS will only use herbicides (upon approval) when no alternative is available.

All research harvesting operations in the Reserve will be planned to protect Park values and visitors' enjoyment of the Park. Research harvesting activities will comply with all applicable federal and provincial laws and regulations (e.g., Crown Forest Sustainability Act, Environmental Assessment Act) as well as Park regulations and operations policies for forest management, including prescriptions for areas of concern (AOCs) identified in the *Algonquin Park Forest Management Plan* (AFA and OMNR 2005). However, exceptions from provincial harvesting standards may be requested from the Park Superintendent for harvesting studies that test the effectiveness of those standards, provided there is a monitoring plan and scientific justification for the requested exception. Non-commercial management of vegetation in the Reserve for research purposes is not part of the Park forest management plan process, however plans for research harvesting will be submitted to the Park Superintendent for approval in proposals for new research as well as in annual work plans.

Policies on research facilities in the Reserve are reflected in the following section:

10.0 Development Policies

10.5 Research Facilities

- *"No new research facilities are planned.*
- *Temporary facilities for approved research may be permitted where appropriate."*

No expansion of the research facilities in the Reserve are planned at this time. If needed, temporary self-contained accommodation (tents or trailers) may be brought into the Reserve for short-term use. If new research facilities become needed to support an approved research project, the section on new developments will be used to guide the process.

New developments (new roads, new buildings, or new studies) are addressed by the following sections:

8.0 Stewardship Policies

8.1 Land

- *"A work permit is required under the* Forest Fires Prevention Act, *the* Public Lands Act, *or the* Lakes and Rivers Improvement Act *for work carried out in Algonquin Park. This includes the construction of buildings, timber harvesting, roads, bridges and water-related facilities but excludes minor maintenance and repairs to existing facilities.*
- *All projects or activities are reviewed through the work permit process to ensure that there are no adverse effects on the Park's natural or cultural values.*
- *Park development projects are exempt from this process but the Ministry of Environment is given prior notification under the* Environmental Assessment Act."

10.0 Development Policies

- *"New developments or improvements to existing structures are carried out in accordance with the Provincial Parks Development Standards and Development Policies, as well as approved site and development plans.*
- *All development projects must conform to the* Environmental Protection Act *and be approved under the* Environmental Assessment Act."

New development projects will comply with all applicable provincial legislation as well as Ontario Parks policies and guidelines.

Policies on the planning and construction of new roads are addressed in the following sections:

8.0 Stewardship Policies

8.1 Land

8.1.1 Soils

- *"For timber harvesting activities, logging roads will be located and constructed to minimize erosion in accordance with the Ministry's* Environmental Guidelines for Access Roads and Water Crossings *[OMNR 1990]. Mitigative techniques, such as reducing slope, installing culverts and sediment traps, using only coarse material in construction, and encouraging regeneration of vegetative cover, are used to minimize soil deterioration and to maintain natural water flows."*

9.0 Operations Policies

9.2 Forest Management

9.2.5 Roads and Landings

- *"All roads must be constructed in accordance with the Ministry's* Environmental Guidelines for Access Roads and Water Crossings *[OMNR 1990], as well as any additional road construction techniques prescribed to protect Park values."*

- *"Maximum road rights-of-way have been established for all types of roads, including primary (13.7 metres), secondary and tertiary (9.1 metres), as well as for roads crossing no-cut timber reserves (6.7 metres)."*
- *"No roads may be constructed within 120 metres of waters, portages, public roads, railway rights-of-way and the Park boundary, except in accordance with the strategy for roads crossing canoe routes (Appendix F)."*

9.2.7 Road Crossings of Waterways and Portages

- ***"Road crossings of waterways and portages*** *are limited to those essential for timber harvesting activities and are subject to other resource protection considerations. Where such crossings are necessary, the protection of fisheries habitat and the maintenance of water quality are provided for through the application of environmental guidelines, such as the Ministry's* Environmental Guidelines for Access Roads and Water Crossings *[OMNR 1990],* Code of Practice for Timber Management Operations in Riparian Areas *[OMNR 1998c], and* Timber Management Guidelines for the Protection of Fish Habitat *[OMNR 1988]. In addition, district approval procedures, mitigative techniques and methods of avoiding critical habitats are used."*

10.0 Development Policies

10.2 Access and Circulation Facilities

- *"No new roads will be constructed in Nature Reserve or Historical Zones."*
- *Waterway and portage crossings by roads will be constructed in accordance with the strategy for roads that cross canoe routes (Appendix F).*
- *No new crossings of portages or canoe routes will be allowed unless no other options are available. This limits waterway and portage crossings by roads to the minimum essential for timber harvesting activities."*
- *"No new road crossings of the boundary are permitted."*

All new roads will be constructed in accordance with provincial and Park guidelines and will be designed and located to minimize the impact on Park values. Planning and construction of new roads will also conform to Park operations policies for forest management, including prescriptions for areas of concern (AOCs). For instance, new roads will not be constructed within 500 metres of lakes that have self-sustaining brook trout populations, as prescribed by the current *Algonquin Park Forest Management Plan* (AFA and OMNR 2005).

The sections of the Park management plan that have the most bearing on FRDS objectives and activities in the Reserve have been explained above. However, the Reserve is bound by all sections of the Park management plan, and any amendments that may be made to it.

8.2. A CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL PARKS AND CONSERVATION RESERVES

All projects in Provincial Parks, and thus in the Reserve, are subject to the provisions of the *Class Environmental Assessment for Provincial Parks and Conservation Reserves* (OMNR 2005). The class environmental assessment (EA) document sets out the processes for determining the amount of evaluation and consultation required prior to implementation to ensure that a project complies with the Environmental Assessment Act. All projects in Provincial Parks must be assessed and assigned to one of four Class EA categories, and are subject to the associated level of evaluation and consultation.

- Category A projects have potential for low net negative environmental effects and/or public or agency concern. Planning and implementation of these projects is thus allowed to proceed in accordance with relevant MNR policies, procedures, bulletins, manuals, and standards, in most cases without further public review or evaluation. However, an MNR manager has the option of subjecting a Category A project to screening if it presents some potential for concern or negative impact.
- Category B projects have potential for low to medium net negative environmental effects and/or public or agency concern and thus require some public notice and project evaluation.
- Category C projects have potential for medium to high net negative environmental effects and/or public or agency concern and thus require a more comprehensive public and agency review.
- Category D projects have potential for high net negative environmental effects and/or public or agency concern and thus require an individual environmental assessment.

Several of the activities associated with the general operations of the Reserve, and the development of the Reserve, are listed in Appendix 2 of the Class EA document as Category A. Other activities in the Reserve must be screened to be assigned to the appropriate category.

- Conducting authorized research (Table 3 c): Category A and no need to be specified in a land use or management direction document
- Operating and maintaining facilities (Table 3 c): Category A and no need to be specified in a land use or management direction document

- Developing buildings (Table 3 b):
  - Building with no services, small building (footprint ≤ 400 m²), or existing building being replaced with one of the same general size and footprint, all in a development zone: Category A and no need to be specified in a land use or management direction document
  - All others, including complex of buildings: Screened for category and must be identified in the appropriate type of land use or management direction document
- Maintaining existing roads, bridges, and parking areas (Table 3 b):
  - Routine maintenance of existing surface to maintain condition, with no change in design standard: Category A and no need to be specified in a land use or management direction document
  - Increase in capacity or improvement of design-standard of existing facility, including major work that significantly extends the life of a facility (e.g. reconstruction of a bridge): Screened for category and must be identified in the appropriate type of land use or management direction document
- Developing new roads, bridges, or parking areas (Table 3 b): Screened for category and must be identified in the appropriate type of land use or management direction document

All projects undertaken in the Reserve will be assessed and assigned to one of the four Class EA categories, and will undergo the associated level of evaluation and consultation.

9. CONTACT INFORMATION

Should questions or issues arise, the following people should be contacted:

9.1. ALGONQUIN PROVINCIAL PARK

Research and extension:

- Park Superintendent
- Park Biologist

Tree harvesting and other scheduling issues:

- Park Forester
- Park Operations South Supervisor

Buildings and other site infrastructure:

- Park Superintendent
- Park Operations and Development Leader (Highway 60 Leader)

Road maintenance and repairs:

- Park Planner
- Park Forester

Management plan review and renewal:

- Park Superintendent
- Park Planner

9.2. FOREST RESEARCH AND DEVELOPMENT SECTION

Research and extension (including Tree harvesting and other scheduling issues) and Management plan review and renewal:

- Hardwood Ecosystem Research Scientist
- Science Management Coordinator
- Manager – Forest Research and Development Section

Infrastructure (including buildings, utilities, and roads):

- Coordinator, Administration, Operations, and Technical Services
- Hardwood Ecosystem Research Scientist
- Manager – Forest Research and Development Section

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11. APPROVALS

Approved by:

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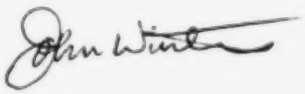

John E. Winters
Algonquin Provincial Park Superintendent

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